

Guidance on Remedial  
Actions for Superfund Sites  
with PCB Contamination  
EPA/540/G-90/007

Chapter 3

Cleanup Level Determination

This section describes various scenarios and considerations pertinent to determining the appropriate level of PCBs that can be left in each media that is contaminated to achieve protection of human health and the environment. For soils, the starting point action level (preliminary remediation goal) is 1 ppm for sites where unlimited exposure under residential land use is assumed. Higher starting point values (10 to 25 ppm) are suggested for sites where the exposure scenario is industrial. Remediation goals for ground water that is potentially drinkable should be the proposed MCL of .5 ppb. Cleanup levels associated with surface water should account for the potential use of the surface water as drinking water, impacts to aquatic life, and impacts through the food chain. Occasionally, stormwater runoff to nearby streams can contribute significant environmental or health risks, especially to those eating contaminated fish.

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### 3.1 Soils

The concentration of PCBs in the soil above which some action should be considered (i.e., treatment or containment) will depend primarily on the exposure estimated in the baseline risk assessment based on current and potential future land use. This section has correspondingly been organized according to categories of alternatives differentiated by the expected direct contact that will occur. Other factors influencing the concentration to which soils should be excavated or contained include the impact the residual concentration will have on ground water and potential environmental impacts. Since these pathways are pertinent to all site categories, they are discussed in separate sections. The guideline concentrations provided in this section do not imply that action must be taken at a Superfund site, rather they indicate the area over which some action should be considered once it has been determined that action is necessary to provide protection of human health and the environment.

A summary of the guidelines discussed in this section is presented in Table 3-1.

TABLE 3-1  
Recommended Soil Action Levels -- Analytical Starting Points  
(Considers ingestion, inhalation, and dermal contact only)

<u>Land Use</u>	<u>PCB Action Levels (ppm)</u>
Residential	1 ppm
Industrial	10 - 25 ppm

These action levels and the assumptions discussed in the following sections can be used to reduce the need for detailed site-specific risk assessments; however, future site uses should be well understood and final cleanup levels must still reflect all relevant exposure pathways and be defensible on a site-specific basis.

The analysis of PCBs is complicated by the fact that there are 209 different PCB compounds<sup>1</sup> (Alford-Stevens, 1986). Common analytical methods are listed in Table 3-2.

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<sup>1</sup>Aracholors are groups of PCBs with different overall percentages of chlorine. For example, Arochlor 1242 contains 42% chlorine made up of tri- and tetra- chlorinated biphenyls. PCB isomers are those compounds that have the same number of chlorine atoms. Individual PCBs isomers, of which there are 209, are called congeners.

### 3.1.1 Preliminary Remediation Goals for Residential Areas

The concentration that defines the area over which some action must be taken is the concentration of PCBs that can protectively be left on site without management controls. In areas where land use is residential, this concentration will be based on standard assumptions for direct contact -- dermal, ingestion, and inhalation -- and should consider potential impact to ground water, which is discussed in section 3.1.4.

For Superfund sites, the risk remaining after remediation should generally fall within the range of  $10^{-4}$  to  $10^{-6}$  individual excess cancer risk. Based on the standard exposure assumptions associated with residential land use (ingestion, inhalation, and dermal contact), concentrations of .1 ppm PCBs to 10 ppm PCBs will generally fall within the protective range. A concentration of 1 ppm PCBs equates to approximately a  $10^{-5}$  excess cancer risk assuming no soil cover or management controls. The 1 ppm starting point for residential scenarios reflects a protective, quantifiable concentration for soil. Lower concentrations (e.g., reflecting a  $10^{-6}$  risk level) are not generally quantifiable and in many cases will be below background concentrations. (Because of the persistence and pervasiveness of PCBs, PCBs will be present in background samples at many sites.) A concentration of 1 ppm PCBs should therefore generally be the starting point for analysis at PCB-contaminated Superfund sites where land use is residential. Alternatives should reduce concentration to this level or limit exposure to concentrations above this level.

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As part of the development of the cleanup levels in the PCB Spill Cleanup Policy, a detailed analysis of the direct contact pathways was performed by the EPA Office of Health and Environmental Assessment (U.S. EPA, 1986a). This analysis was subsequently updated to account for the revised cancer potency factor and ingestion assumptions (U.S. EPA, 1988d). This analysis estimates risk levels associated with various concentrations of PCBs based on physical parameters of PCB 1254. It is also estimated that a 10 inch cover of clean soil will reduce risks by approximately one order of magnitude. Using some of the basic assumptions associated with PCBs (e.g., mobility, volatility, absorption) described in this analysis and the standard exposure assumptions for residential land use presented in the Risk Assessment Guidance (U.S. EPA, 1989e), risk levels associated with various concentrations of PCBs in soil were calculated (see Appendix B). This analysis forms the basis for the

analytical starting point summarized here. The primary assumptions and an example calculation for a PCB concentration of 1 ppm are shown in Table 3-3. It should be noted that some of these assumptions may be overly conservative on a site-specific basis. For example, the calculation for the inhalation pathway assumes that someone is on the site 24 hours a day for 30 years and that the concentration of PCBs in the air in a house on this site will be the same as the concentration in the air outside. In many cases, partial covering of the soil will limit the level of PCBs that can volatilize. Another consideration is that the calculation was based on the properties of Arachlor 1254 and properties may vary for different congeners as shown in Table 3-4. Toxicities may also vary (McFarland, 1989; Kimbrough, 1987; Safe, 1985), though there is limited information on this and the toxicity based on Arachlors 1254 or 1260 should generally be used.

As noted above, these calculations reflect direct exposure assumptions only and may not be appropriate where ground water or ecological habitats are potentially threatened. These levels are consistent with the guidance provided by the PCB Spill Cleanup Policy which recommends a 10 ppm cleanup level with a 10 inch cover for residential areas.

### 3.1.2 Preliminary Remediation Goals for Industrial/Remote Areas

In remote areas or areas where land use is industrial, a more appropriate concentration at which to start analysis may be 10 to 25 ppm, since direct exposure is less frequent than for residential land use and higher concentrations will be protective. (Under the PCB Spill Policy this category includes sites that are more than .1 km from residential/commercial areas or where access is limited by either man-made or natural barriers (e.g., fences or cliffs).) For example, at Superfund sites located in industrial areas ingestion and inhalation exposures are more limited than for a residential area. Even assuming exposure equivalent to that in residential areas, these levels (10 to 25 ppm) are still within the acceptable risk range (approximately  $10^{-4}$ ) based on the direct contact exposure pathways, and in fact will reflect a lower risk due to the reduced frequency of exposure expected at the site. This is consistent with the PCB Spill Cleanup Policy which recommends a cleanup level of 25 to 50 ppm for sites in industrial or other reduced access areas.